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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LUM, LEON YUN BON	
ART UNIT	**PAPER NUMBER**
1641	

DATE MAILED: 04/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/074,499	ALOCILJA ET AL.	
	Examiner	Art Unit	
	Leon Y. Lum	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,7-10,14-16,18,19,21,22,24 and 26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,7-10,14-16,18,19,21,22,24 and 26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed 07 February 2005 is acknowledged and has been entered.

Election/Restrictions

2. Applicant's election without traverse of Group I, claims 1-3, 7-10, 14-16, 18-19, 21-22, 24, and 26 in the reply filed on 07 February 2005 is acknowledged. It is also noted that claim 15, which was indicated in the reply as amended to become dependent on claim 14, is now part of the elected group.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-3, 7-10, 14-16, 18-19, 21-22, 24, and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. In claim 1 (lines 16-17), claim 7 (lines 17-18), claim 8 (lines 15-17), and claim 14 (lines 17-19), the phrase "forms a complex in absence of electrically conductive metal particles in the complex" is vague and indefinite. It is unclear whether the metal

particles are present before the complex is formed and whether the metal particles are part of the sample or capture reagent.

6. In claims 8 and 14, lines 13-14 and 15-16, respectively, the phrase "wherein when a fluid sample containing an antigen which is bound by the second antibody" is vague and indefinite. It is unclear whether the antigen is bound by the antibody in the sample prior to or after being introduced into the second zone (line 9).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-2, 7-9, 14-16, 18-19, and 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (Biosensor & Bioelectronics (2000), vol. 14, pp. 907-915) in view of Manz et al (WO 00/03233).

In the instant claims, Kim et al teach a conductimetric immunosensor design comprising a middle section that contains screen-printed thick film electrodes in an interdigitated structure, wherein antibodies are immobilized on the interdigitated area (i.e. first zone contains a first capture agent in a defined area) comprising silver electrodes, wherein an anode and cathode are separated and the binding complex on the interdigitated structure is formed in between the electrodes (i.e. between electrodes on different sides of the defined area). See page 911, right column, 1st full paragraph, lines 1-5; and Figure 3, and caption. In addition, Kim et al teach that the immunosensor comprises a lower section that is defined with immobilized antibody-gold conjugates, wherein the lower section is a glass fiber membrane for sample application (i.e. a

second of the zones containing a fluid transfer medium and a second capture reagent), and wherein the gold embodiment of the antibody-gold conjugates contain polyaniline as a conducting polymer (i.e. bound to an electrically conductive polymer). See page 911, right column, 2nd full paragraph, lines 1-7; and Figures 1 and 3-4, and captions. Furthermore, Kim et al teach that after the immunostrips are placed in microwells, solutions within the microwells are absorbed from the bottom of the strips, wherein the medium dissolved the gold conjugate, reaction between the conjugate and the analyte took place to produce a complex, the complex was carried up into the next membrane with the immobilized binder (i.e. complex migrates to the first zone), and a second antigen-antibody reaction formed a sandwich-type immune complex at the gold surfaces, wherein a meter was used to measure the conductivities as responses of the immunostrips with the electrodes to variable analyte concentrations (i.e. alter the conductivity of the defined area to detect the analyte). See page 909, right column, 2nd full paragraph to page 910, left column, 1st paragraph.

However, Kim et al fail to teach that the complex is formed in the absence of any electrically conductive metal particles in the complex.

Manz et al reference teaches conductive polymer beads with a specific molecular probe immobilized on the surface, in order to perform combinatorial bioassays in small batches. See page 16, lines 8-10.

It would have been obvious at the time of the invention to modify the apparatus of Kim et al with conductive polymer beads with a specific molecular probe immobilized on the surface, as taught by Manz et al, in order to perform combinatorial bioassays in

small batches. One of ordinary skill in the art at the time of the invention would have had reasonable expectation of success in including conductive polymer beads, as taught by Manz et al, in the apparatus of Kim et al, since Kim et al teach a device with means to immobilize a conductive bead through specific binding with molecules on the bead surface, and the bead of Manz et al is a also conducting material and includes surface presenting molecular probes for specific binding.

With regards to claims 2, 9, and 15, Kim et al teach a cellulose membrane that is an absorption pad as an upper section of the immunosensor strip (i.e. third zone adjacent to the first zone). See Figures 1 and 3, and captions.

With regards to claims 16, 18-19, and 21, Kim et al teach microwells with sample medium into which the immunostrips were placed (i.e. third zone or pad is applied), as stated above. See page 909, 2nd full paragraph, lines 8-18; and Figure 1 and caption. Since the term "pad" has not been defined in the specification, the instant term is considered to be any substrate capable of containing a liquid sample medium.

With regards to claims 7 and 14, Kim et al also teach that voltage was applied across the electrodes (i.e. electrical means) and that conductimetric detection was performed by a conductivity meter, wherein the measurements can determine a transient response after complex formation between antigen and antibody (i.e. measuring means for determining a change in the conductivity of the first area between and after application of the sample). See page 910, left column, 1st paragraph, lines 5-8; and page 912, right column, 2nd full paragraph, lines 1-4.

11. Claims 3, 10, 22, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (Biosensor & Bioelectronics (2000), vol. 14, pp. 907-915) in view of Manz et al (WO 00/03233) as applied to claims 1, 8, and 14 above, and further in view of Roberts et al (US 5,958,791).

Kim et al and Manz et al references have been disclosed above, but fail to teach a multiple array (claims 22, 24, and 26), and also fail to teach that the first defined area has a dimension between the electrodes of 1.0 mm (claims 3 and 10).

Roberts et al reference teaches a test device that includes multiple sets of interdigitated electrode arrays with an area of 6mm x 1mm, in order to perform simultaneous multiple analyte detection and assay a test sample for a plurality of analytes. See column 18, lines 53-55; column 24, lines 1-6; and column 25, lines 16-20. In addition, Roberts et al teach that the test device is a test strip with capillary flow through an absorbent material with a capture region, wherein the capture region contains binding material that can be an antibody. See column 5, lines 29-42 and 55-56; column 11, lines 29-40; and Figure 1.

It would have been obvious at the time of the invention to modify the method of Kim et al and Manz et al with a test device that includes multiple sets of interdigitated electrode arrays with an area of 6mm x 1mm, as taught by Roberts et al, in order to perform simultaneous multiple analyte detection and assay a test sample for a plurality of analytes. One of ordinary skill in the art at the time of the invention would have had reasonable expectation of success in including multiple sets of interdigitated electrode arrays with an area of 6mm x 1mm, as taught by Roberts et al, in the device of Kim et al

and Manz et al, since Kim et al and Manz et al teach a test strip with an antibody-layered capture region on an interdigitated electrode wherein sample can flow up the strip, and the interdigitated electrode arrays of Manz et al also include a capture region with immobilized antibody, and are on a test strip that can accommodate capillary flow.

Response to Arguments

12. Applicant's arguments with respect to claims 1-3, 7-10, 14, 16, 18-19, 21-22, 24, and 26 have been considered but are moot in view of the new ground(s) of rejection.

13. On pages 12-13, regarding the rejection of said claims with Kim et al reference, Applicant argues that Kim et al "makes clear that the metal particles are required for generation of the signal" (see page 12, beginning of 1st full paragraph) and that "one skilled in the art would be directed away from eliminating the metal (gold) particles based upon the teachings of the reference" (see 13, end of 1st paragraph), and cites the first paragraph of the discussion of page 913 and the conclusion of page 914.

While Kim et al does states that the metal particles are required for generation of the electrical signal, any particle which is conducting would be able to perform the same function. The reference states that polymeric conductor molecules covering the surface of the gold particles provides a conductive substance that resolves the "electronic barrier" caused by protein molecules on the surface and enhances the electric conduction (see page 913, 1st-3rd paragraphs of the Discussion; and Figure 4). The

polymeric molecules restore the conductive capabilities of the metal particles by extending the conduction from underneath the protein layer of the particle. Since the conductive substances are polymeric molecules, Kim et al actually teaches that, in addition to metal particles, polymeric particles can provide conduction of the electric signal in the test device. Manz et al reference, as stated in the rejection supra, teaches a conductive polymer bead with immobilized capture molecules. Since the metal bead of Kim et al is required to include surface-immobilized binding molecules, it would have been obvious to one of ordinary skill in the art to substitute the metal bead of Kim et al with the polymer bead of Manz et al since the polymer bead is able to perform the same functions as the metal bead and includes the required elements of (1) immobilized capture molecules on the bead surface and (2) means for generating an electric signal through conductivity. Therefore, while removing the gold particle without an appropriate replacement would be teaching away from Kim et al, the conductive polymer bead of Manz et al would also be able to generate the same type of signal as the metal particle and does not teach away from Kim et al. In addition, the conductive polymer bead of Manz et al enhances Kim et al with the motivation of applying the polymer beads in combinatorial bioassays. Applicants' arguments are therefore not convincing.

14. On pages 13-14, Applicant contends that Roberts et al could not be used in the present invention since the reference teaches the "use of marker encapsulated liposomes and lysing agents for the liposomes to release the marker" (see page 13, last paragraph), that "the use of liposomes is completely superfluous to Applicants' device"

(page 13 to page 14), and that the "multiple arrays of electrodes in Roberts et al...are used in a different manner" (page 14, 1st paragraph).

In response to applicant's argument that Roberts et al is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Roberts et al is not nonanalogous art because the portions of the reference relied upon are directed towards interdigitated electrodes, test strips with capillary flow, and biological capture agents in a binding region, all of which are elements disclosed in Kim et al reference, which has been properly applied as stated in the rejection supra. The use of the electrodes and test strip in Roberts et al to lyse liposomes does not teach away from Kim et al since Roberts et al is not relied upon for the teaching of lysing liposomes. The function of the test strip in Kim et al is to detect analytes, as is the function of the test strip of Roberts et al, as clearly indicated in the cited sections (see column 5, lines 29-42). Since both references teach interdigitated electrodes as detection means, one of ordinary skill in the art would have had reasonable expectation of success in applying the multiple sets of interdigitated electrode arrays, as taught by Roberts et al in the device of Kim et al, with the proper motivation of performing simultaneous analyte detection. Applicants' arguments are therefore not convincing.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Y. Lum whose telephone number is (571) 272-2878. The examiner can normally be reached on weekdays from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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